TABLE 1.—*Preliminary mean sea-surface temperatures (°F.) in the Caribbean Sea and Straits of Florida, January, 1932*

Quarter	Period	Caribbean Sea			Straits of Florida		
		Mean	Departure from 13-year mean (1920–1932)	Change from preceding month	Mean	Departure from 13-year mean (1920–1932)	Change from preceding month
		°F.	°F.	°F.	°F.	°F.	°F.
I		80.0	+0.6	----------	77.3	+2.1	----------
II		79.5	+0.2	----------	76.0	+1.0	----------
III		79.6	+0.6	----------	76.7	+1.8	----------
IV		79.5	+0.8	----------	76.5	+2.0	----------
	Month	79.6	+0.5	−1.0	76.6	+1.7	−1.8

Table 1 shows the preliminary mean temperatures in the Caribbean Sea and the Straits of Florida for January, 1932.

CARIBBEAN SEA

The Caribbean Sea is defined as the area included between the American Continents on the south and west and the Greater Antilles and outermost Lesser Antilles on the north and east. The Mona Passage, the Windward Channel south of 20° N., and the Yucatan Channel west from Cape San Antonio to the eighty-fifth meridian, north on this meridian to 22° N., west to 87° W., and south to the Yucatan Peninsula, are included.

January, 1932, was a warm month in the Caribbean Sea, being the twenty-third consecutive month with a temperature at or above the 13-year mean (1920–1932).

STRAITS OF FLORIDA

The Straits of Florida data refer to the western part of the Straits area, that bounded on the east by the eightieth meridian, on the north by the twenty-fifth parallel, on the west by the eighty-fourth meridian, and on the south by the Cuban coast.

The month of January, 1932, was the warmest January of record (1920–1932), being 0.8 above the previous warmest which occurred in 1924 and 1925, in both of which years the mean January temperature was 75.8° in the Straits of Florida.

SUMMARY OF SEA-SURFACE TEMPERATURE DATA FOR 1931

By GILES SLOCUM

The data for the Caribbean Sea and the Straits of Florida for 1931 are here summarized, as a whole, for reasons discussed in this issue under the caption, "Sea-Surface Temperature Observations, January, 1932."

In the accompanying table the values for the first 11 months of 1931 are final. Those for December are based on about 97 per cent of the data that is expected to be available. Corrected values for this month will be given later.

CARIBBEAN SEA

The monthly mean temperature of the Caribbean Sea was higher than the average throughout 1931. The means for January, March, April, May, June, July, and August were the highest of record for these months during the 12 years for which adequate data have been collected and analyzed, and so also were their departures from the 12-year means. The previous greatest positive departures, 0.8°, occurred in September and October, 1927, and December, 1930.

May was the most extreme month in 1931. This usually is a midspring month, characterized as it progresses by a rapid rise in temperature in the Caribbean Sea, but not by relatively high temperatures in the course of the annual seasonal march, and it usually is nearly as cool as December, a late autumn month. May, 1931, had a mean temperature of 82.4°, which is 1.8° above the May mean. Since 1920, no other May or June was as warm, and only one July, which was slightly warmer. The average for this month, May, 1931, was indeed higher than is usual for August, the month just preceding the normally warmest of the year. No month in the years 1920 to 1923, inclusive, had a temperature exceeding that of this May.

February, September, and October, 1931, were each once exceeded in temperature by the same respective months in previous years. November and December of this year were not greatly warmer than average.

The surface water of the Caribbean Sea was extremely warm throughout the winter of 1930–31, and the spring rise in temperature, while more rapid than usual, was, by reason of the high temperatures which already prevailed, not different in nature from the rise in other years. The change from the high, but not unprecedented temperature of February, 1931, to the conspicuously extreme anomalous condition in May, took place gradually without remarkable interruptions or accelerations.

The spring temperatures of 1931 were so high that midsummer conditions prevailed for half the year instead of approximately a fourth to a third, as in the usual year. The departures from the mean for the months after May, 1931, were progressively smaller through the summer. While the decrease in magnitude of these departures did not reverse or interrupt the usual seasonal march of progressively warmer months through the summer until the warmest month, September, it did conspicuously flatten the curve representing the march of temperature during the year as compared with that for other years.

By autumn, the extreme thermal abnormality of the spring and early summer months of 1931 had somewhat moderated. Since a diminishing positive anomaly persisted, however, through the fall months, the progression of the temperature curve was much like the normal seasonal march during these final months of the year.

Considering the extreme temperature abnormality of the spring of 1931 from still another angle, that of the relative size of the temperature anomaly in comparison with the annual range, the May, 1931, anomaly was over two-fifths of the mean annual change from winter to summer, which is only 4.3°. The departures for April, June, and July were also conspicuously large, being over a third of the mean annual range.

STRAITS OF FLORIDA

In the Straits of Florida, the first four months of 1931 continued a period, begun in December, 1930, of relatively far subnormal temperatures. Subsequently, the abnormal warmth of the Caribbean Sea appears to have spread into this region. May, June, and November, 1931, were somewhat cooler than the seasonal average, but July, August, September, October, and December were each warmer than their 12-year means—the latter indeed being the warmest December in the period of record. In this respect, the warmth of this month resembled the extreme positive anomalies found in the

Caribbean during the early summer. The year 1931, as a whole, was, however, next to 1920, the coolest thus far found in the Straits area.

While the year as a whole was cool, the temperatures rose with unusual rapidity during the time occupied by the transition from extremely subnormal temperatures in the winter and early spring of 1930–31 to the above-average temperatures which came into evidence in the Straits early in the summer.

GENERAL SUMMARY

The year 1931 in the areas under discussion was probably the most interesting in all respects of any in the term of years covered by the Weather Bureau sea-surface temperature records, the more especially so since it was also an unusual year over continental United States. The extreme conditions briefly described in this summary invite further analysis of the available facts. Treatments of limited phases of such further analysis are in preparation in connection with studies of the entire period from 1919 to the present.

The abnormality of the 1931 sea-surface temperatures in the Caribbean, and to a lesser extent in the Straits, while striking, should, however, still be viewed in proper perspective. The period for which observations have been statistically treated covers only 13 years, and the first year of the 13 is represented by too few observations to be adequately comparable with the other 12. In climatic discussions, this is a short period of time. What is unprecedented in a period of 12 or 13 years of meteorological or oceanographic history of phenomena stands a chance, approaching certainty, of being highly abnormal in a considerably longer period of years, but there is only a small probability that it represents the extreme is such a long period as, say, a century.

Again, the temperature departures from the averages, while proportionately much larger than have been found to have occurred in any other year studied, and while large in relation to the annual range, were yet small in the absolute sense. Temperature ranges and abnormalities of ordinary occurrence in the atmosphere usually run many times greater than the small values of these remarkable abnormalities of 1931 in the Caribbean and Straits of Florida. The range in water temperature in subpolar and temperate seas also generally is much larger than that shown in these tropical and subtropical waters.

Not only is the period of years covered a short one but the geographical area considered is small on the world scale and the statistical analysis thus far made in even this circumscribed area may be inadequate as a true picture of average temperature conditions surrounding the origins of the surface waters of the Gulf Stream.

The significance, or effect, of the abnormalities in relation to the so-called "thermal cargo" of the Gulf Stream is still wide open to further and more rigorous investigation. Some aspects of this problem will be attacked with the data now in hand covering 13 years, but a much longer period of accurate results must be assembled before the problem can be said to have received proper treatment.

TABLE 1.—*Mean sea-surface temperatures (°F.) and number of observations, January to December, 1931*

Month	Caribbean Sea				Straits of Florida			
	Number of observations	Mean	Departure from 12-year mean (1920–1931)	Change from preceding month	Number of observations	Mean	Departure from 12-year mean (1920–1931)	Change from preceding month
		°F.	°F.	°F.		°F.	°F.	°F.
January	550	80.1	+1.1	−1.1	126	73.5	−1.3	−1.4
February	498	79.2	+0.7	−0.9	130	73.6	−0.9	+0.1
March	504	79.6	+0.9	+0.4	132	73.2	−1.6	−0.4
April	526	80.6	+1.2	+1.0	138	75.1	−1.7	+1.9
May	522	82.4	+1.8	+1.8	157	78.4	−0.4	+3.3
June	589	83.0	+1.5	+0.6	154	81.2	−0.3	+2.8
July	604	83.2	+1.4	+0.2	185	83.5	+0.3	+2.3
August	621	83.3	+1.1	+0.1	148	84.4	+0.5	+0.9
September	577	83.4	+0.6	+0.1	158	84.0	+0.5	−0.4
October	586	83.1	+0.5	−0.3	173	81.8	+0.4	−2.2
November	504	81.8	+0.1	−1.3	164	78.5	−0.2	−3.3
December [1]		80.6	+0.2	−1.2		78.4	+1.9	−0.1
Year [1]		81.7	+0.9			78.8	−0.2	

[1] Data incomplete. Figures are preliminary values subject to revision.